Assignment No.4

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Download latex-tikz codes from

https://github.com/Panisha707/ASSIGNMENT04/blob/main/main.tex

Download python codes from

https://github.com/Panisha707/ASSIGNMENT04/blob/main/untitled24.py

Question taken from

linear_form, exercises 2.3,i,j

1 Question No 1

Draw the graphs of the following equations

$$a)\ \begin{pmatrix}1 & 1\end{pmatrix}\mathbf{x} = 0 \tag{1.0.1}$$

$$b)\ \begin{pmatrix}1 & -1\end{pmatrix}\mathbf{x} = -2 \tag{1.0.2}$$

2 Solution

a) let $\mathbf{x} = \begin{pmatrix}a\\0\end{pmatrix}$

$$\begin{pmatrix}1 & 1\end{pmatrix}\begin{pmatrix}a\\0\end{pmatrix} = 0 \tag{2.0.1}$$

$$\implies a = 0 \tag{2.0.2}$$

similarly let $\mathbf{x} = \begin{pmatrix}0\\b\end{pmatrix}$

$$\begin{pmatrix}1 & 1\end{pmatrix}\begin{pmatrix}0\\b\end{pmatrix} = 0 \tag{2.0.3}$$

$$\implies b = 0 \tag{2.0.4}$$

$$\mathbf{P} = \begin{pmatrix}0\\0\end{pmatrix} \tag{2.0.5}$$

For point $\mathbf{Q}$,
let $\mathbf{x} = \begin{pmatrix}x\\y\end{pmatrix}$

$$\begin{pmatrix}1 & 1\end{pmatrix}\begin{pmatrix}x\\y\end{pmatrix} = 0 \tag{2.0.6}$$

$$\implies x = 2 \tag{2.0.7}$$

$$\implies y = -2 \tag{2.0.8}$$

intercept on X and Y axis can be written as

$$\mathbf{P} = \begin{pmatrix}0\\0\end{pmatrix}, \mathbf{Q} = \begin{pmatrix}2\\-2\end{pmatrix} \tag{2.0.9}$$

b) let $\mathbf{x} = \begin{pmatrix}a\\0\end{pmatrix}$

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}a\\0\end{pmatrix} = -2 \tag{2.0.10}$$

$$\implies a = -2 \tag{2.0.11}$$

similarly let $\mathbf{x} = \begin{pmatrix}0\\b\end{pmatrix}$

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}0\\b\end{pmatrix} = -2 \tag{2.0.12}$$

$$\implies b = -2 \tag{2.0.13}$$

intercept on X and Y axis can be written as

$$\mathbf{A} = \begin{pmatrix}-2\\0\end{pmatrix}, \mathbf{B} = \begin{pmatrix}0\\-2\end{pmatrix} \tag{2.0.14}$$

Graphs of the equations (a) and (b) are constructed by using python as

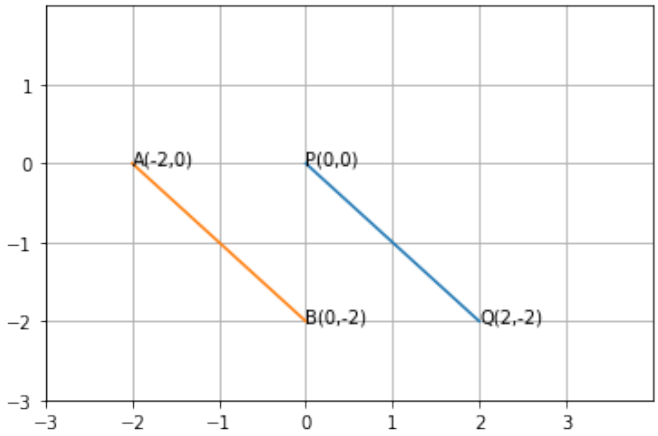

Fig. 2.1: Graphs of Equations (a) and (b)